

# **POWER SUPPLY WITHOUT COOLING FAN**

## **BACKGROUND OF THE INVENTION**

### **[01] Field of the Invention**

5           The invention relates in general to a cooling technique field of a power supply for a computer, and more particularly to a cooling device for a power supply, which can reach an expected cooling effect without the cooling fan. The present invention features in a high-effect heat pipe connecting a plurality of aluminum-extrusion heat sink fins and a plurality of aluminum-extrusion heat sinks, the aluminum-extrusion  
10   heat sink fins fixed above a cooling chip over the circuit board, and the aluminum-extrusion heat sinks fringed near the power supply, with a part of the heat sink fins exposed to the power supply. The heat of a chip is conducted out of the power supply by the aluminum-extrusion heat sink fins, the high-effect heat pipe, and the aluminum-extrusion heat sinks.

### **[02] Description of the Related Art**

15           Along with the popularization of computers in the market, every operation job has become more facilitated. And also with the continuous advancement and upgrading of every component of computer equipment, a computer system can process  
20   more and more software and data. Therefore, the ascending temperature of related parts of the computer and disturbing noise by a heat sink fan in order to cool the heat becomes a future problem.

25           In order to supply required power for operation of system devices inside a computer, the general computer mainframe is installed with a power supply. The power supply works on transforming general alternating current (A.C.) into required

stable direct current (D.C.) for every part. Both switching power supply and the computer system need a stable and reliable heat sink system to maintain normal functions. Usually, when the power supply works on transforming A.C. to D.C., it causes an ascending temperature effect. In addition, noise by a heat sink fan in order to cool the heat becomes a disturbing problem.

For general power supply, cooling chips are installed with stand-up heat sink fins, which are mostly of aluminum-extrusion mold. In addition, a cooling fan is fringed inside the power supply near the external housing thereof. The contact and heat conduction of the heat sink fins and the chips, and also cold air generated by the fan is conducted to sway the heat sink fins, so as to cool down and prevent unbalance or damage from the ascending temperature of the power supply. It may be not a problem for those power supplies requiring low watts, however, for those power supplies requiring high quality and high wattage with strict demands no crashes are allowed when the computer is executing programs, this is difficult to reach.

### **[03] SUMMARY OF THE INVENTION**

In view of the above-mentioned disadvantages, it is therefore the object to provide a power supply without a cooling fan. The present invention includes a plurality of aluminum-extrusion heat sink fins fixed above a cooling chip inside the power supply, a high-effect heat pipe connecting a plurality of aluminum-extrusion heat sink fins and a plurality of aluminum-extrusion heat sinks, and the aluminum-extrusion heat sinks fringed near the power supply, with a part of the heat sink fins exposed to the power supply. Heat of a chip can be absorbed by the aluminum-extrusion heat sink fins, and they are also conducted to the heat sink fins by the high-effect heat pipe immediately, so that not only the heat is conducted out of the power supply, but also the aluminum-extrusion heat sinks take a cooling effect. Therefore, the power supply can reach an expected cooling effect without the cooling

fan.

The present invention of the power supply without a cooling fan truly can reach the expected cooling effect after a test. With reference to FIG. 5, it shows a temperature distribution of cooling in the present invention, which proves that the invention can exactly reach the expected cooling to promote efficiency. Accordingly, the present invention includes the following advantages:

First, the power supply does not need the cooling fan, which can reduce production cost obviously, decrease assembling and procedures of power connection.

Second, the power supply without the cooling fan can decrease extra consumption of power.

Third, no excessive high temperature would occur due to fan malfunction.

Fourth, there is no disturbing noise due to the operation of the fan.

To conclude from the above description, the present invention makes efforts in research and development to improve conventional deficiency of the power supply. Therefore, the power supply with stable cooling function is provided.

Other objects, features, and advantages of the invention will become apparent from the following detailed description of the preferred but non-limiting embodiments. The following description is made with reference to the accompanying drawings.

#### **[04] BRIEF DESCRIPTION OF THE DRAWINGS**

FIG. 1 is a three-dimensional diagram viewed from the front of the present invention.

FIG. 2 is a three-dimensional diagram viewed from the back of the present invention.

FIG. 3 shows a three-dimensional diagram of a related location of the aluminum-extrusion heat sink fins, the aluminum -extrusion heat sinks, and the high-effect heat pipe of the present invention.

FIG. 4 shows a decomposition diagram of the main parts of the present invention.

## **[05] DETAILED DESCRIPTION OF THE INVENTION**

The present invention of a power supply without a cooling fan includes a base (1), a circuit board (2), an plurality of aluminum-extrusion heat sink fins (3) (3'), a high-effect heat pipe (4), a plurality of aluminum-extrusion heat sinks (5), a panel board (6), an outer decking (7), and a back panel (8), so as to compose the power supply.

With reference to FIG. 3, the present invention of the power supply features in the aluminum-extrusion heat sink fins (3) (3') of stand-up mode fixed above a cooling chip over the circuit board (2), with penetrating holes (31) (31') above thereof. In addition, the aluminum-extrusion heat sinks (5) are fringed near the power supply, with a part of the heat sink fins of the aluminum-extrusion heat sinks (5) exposed to the power supply. And also, a penetrating hole (51) is also installed at an appropriate position of the aluminum-extrusion heat sinks (5).

With reference to FIG. 4, the aluminum-extrusion heat sink fins (3) (3') and the aluminum-extrusion heat sinks (5) are connected through the penetrating holes (31) (31') (51) by the high-effect heat pipe (4). Accordingly, the heat of a chip of the circuit board (2) can be absorbed by the aluminum-extrusion heat sink fins (3) (3'), and

also is conducted to the heat sinks (5) exposed to the power supply by the high-effect heat pipe (4) immediately, so that not only the heat is conducted out of the power supply, but also the aluminum-extrusion heat sinks take a cooling effect. Therefore, the power supply can reach an expected cooling effect without the cooling fan. FIG. 5 shows a temperature distribution of cooling effect of the present invention.

With reference to FIG. 1, FIG. 2, and FIG. 3, together with the power supply without the cooling fan of the present invention, dispersed heat sink fins (71) (72) can be installed above and aside the outer decking (7) to increase the entirety of the cooling effect.

While the invention has been described by way of example and in terms of a preferred embodiment, it is to be understood that the invention is not limited thereto. On the contrary, it is intended to cover various modifications and similar arrangements and procedures, and the scope of the appended claims therefore should be accorded the broadest interpretation so as to encompass all such modifications and similar arrangements and procedures.